

Amendments to the Specification:

Please amend the specification as follows:

Please replace paragraph number [0002], with the following rewritten paragraph:

[0002] In a digital versatile disc (DVD)/compact disc (CD) recorder or a DVD/CD player that reads or writes information to or from an optical disc such as a DVD or a CD, an optical pickup includes components that radiate heat such as a semiconductor laser that is a light source for irradiating a beam to an optical disc, and an integrated circuit of a drive circuit that drives the semiconductor laser. In such an optical pickup, a semiconductor laser that emits a shorter wavelength is employed as a light source to satisfy demands for miniaturization, weight saving, and densification. ~~Although such a shorter-wavelength semiconductor laser can produce a beam having a small diameter on an optical disc, the shorter-wavelength semiconductor laser has a disadvantage that to output the same power of a light, the shorter-wavelength semiconductor laser requires a larger electric power than, and because a larger electric power required, a heat generated in the semiconductor laser is large~~ Although such a shorter-wavelength semiconductor laser can produce a beam having a small diameter on an optical disc, the shorter-wavelength semiconductor laser has a disadvantage that to output the same power of a light as a longer-wavelength semiconductor laser emits, the shorter-wavelength semiconductor laser requires a larger electric power than the longer-wavelength semiconductor laser, and because a larger electric power required, a heat generated in the shorter-wavelength semiconductor laser is large. For this reason, unless heat is efficiently radiated from the optical pickup, a substantial amount of heat gets accumulated, so that output of the optical pickup cannot be increased and life of the optical pickup is shortened.

Please replace paragraph number [0004], with the following rewritten paragraph:

[0004] Non-patent Document 1: Pioneer Corporation, Engineering Information Journal, PIONEER R&D, 1996 1997, Vol. 7, No. 1.

Please replace paragraph number [0008], with the following rewritten paragraph:

[0008] According to the present invention, heat generated in an optical pickup is conducted via a heat conducting member to a protective cover that is generally provided for protecting the optical pickup 40 and a drive mechanism, thereby obtaining a heat sink with a large surface area. Furthermore, because the protective cover is directly blown with an air flow generated by turning a disc, thermal diffusion at the protective cover is efficient, so that a countermeasure, such as providing a radiating fin at the protective cover to improve radiation efficiency, is not required. Thus, a rise in temperature of a laser light source can be efficiently suppressed.

Please replace paragraph number [0009], with the following rewritten paragraph:

[0009] ~~[Fig. 1]~~ Fig. 1 is a schematic for explaining a heat radiating mechanism of an optical pickup apparatus according to a first embodiment of the present invention;

~~[Fig. 2]~~ Fig. 2 is a schematic for explaining a heat radiating mechanism of an optical pickup apparatus according to a second embodiment of the present invention;

~~[Fig. 3]~~ Fig. 3 is a schematic for explaining a heat radiating mechanism of an optical pickup apparatus according to a third embodiment of the present invention;

~~[Fig. 4]~~ Fig. 4 is a perspective view of a heat radiating mechanism of an optical pickup apparatus according to an example 1 of the present invention;

~~[Fig. 5]~~ Fig. 5 is a perspective view of an internal structure of the optical pickup apparatus according to the example 1; and

~~[Fig. 6]~~ Fig. 6 is an exploded perspective view of an optical system installed

on the optical pickup apparatus according to the example 1.

Please replace paragraph number [0010], with the following rewritten paragraph:

[0010]

- 1 Turntable
- 2 Optical disc
- 10 Optical pickup
- 11 Pickup base
- 12 Holder for adjusting
- 13 Objective lens
- 14 Spring
- 20 Semiconductor laser
- 30 Protective cover
- 40, 41 Heat conducting members
- 45 Circuit board
- 46 Supporting frame
- 47 Flexible printed-circuit board
- ~~60 Semiconductor laser for DVD~~
- 60 Semiconductor laser element for DVD
- ~~61 Semiconductor laser for CD~~
- 61 Semiconductor laser element for CD

Please replace paragraph number [0012], with the following rewritten paragraph:

[0012] [First embodiment]

Fig. 1 is a schematic for explaining a heat radiating mechanism of an optical pickup apparatus according to a first embodiment of the present invention. In Fig. 1, an optical disc 2 (optical recording medium), such as a digital versatile disc (DVD) or

a compact disc (CD), is placed on a turntable 1. An optical pickup 10 is arranged opposite to the optical disc 2. The optical pickup 10 is movable in a radial direction of the optical disc 2, i.e. a tracking direction (direction of arrow A). A semiconductor laser 20 is mounted on a pickup base 11 of the optical pickup 10 via a holder for adjusting 12. The holder for adjusting 12 adjusts a position and an angle of the semiconductor laser 20 with respect to the pickup base 11 such that an optical axis of the semiconductor laser 20 is aligned with an optical axis of an optical system in the optical pickup 10 by eliminating mounting deviation. An objective lens 13 installed on the optical pickup 10 is movable in the tracking direction A and in a focusing direction with respect to the pickup base 11. The holder for adjusting 12 is formed from a material excellent in thermal conductivity such as metal.

Please replace paragraph number [0015], with the following rewritten paragraph:

[0015] The ~~ductile~~ heat conducting member 40 is formed of, for example, a sheet made from carbon fiber, a metal sheet or foil of copper or aluminum, or a flexible printed-circuit board. The ~~ductile~~ heat conducting member 40 can be fixed to the corresponding part by, for example, bonding with a thermally conductive adhesive, a thermally conductive adhesive tape, a bond, soldering, or the like, ~~crewing~~, clamping with a spring, binding with a presser part, or the like. It is preferable that the heat conducting member is ductile, because a ductile heat conducting member does not exert force onto the optical pickup 10 that is moving.

Please replace paragraph number [0016], with the following rewritten paragraph:

[0016] Thus, according to the first embodiment, heat generated in the optical pickup 10 is conducted via the heat conducting member 40 to the protective cover 30 that is generally provided for a purpose of protecting the optical pickup 10 and the drive mechanism, thereby obtaining a heat sink having a large surface area. Furthermore, because the protective cover 30 is directly blown with an air flow

generated by turning a disc as shown with arrow B, thermal diffusion at the protective cover 30 is efficient, so that a countermeasure, such as providing a radiating fin at the protective cover 30 to improve radiation efficiency, is not required. Thus, a rise in temperature of the semiconductor laser 20 can be efficiently suppressed.

Please replace paragraph number [0017], with the following rewritten paragraph:

[0017] Furthermore, unlike the conventional technology that additionally provides a heat radiating member, heat is radiated by using the protective cover 30 that has a large surface area and is already provided over the optical pickup 10, thereby obtaining an optical pickup that is small, light, and low-cost.

Please replace paragraph number [0021], with the following rewritten paragraph:

[0021] [Third embodiment]

Fig. 3 depicts a heat radiating mechanism of an optical pickup apparatus according to a third embodiment of the present invention. In the third embodiment, a heat conducting member 41 that connects between the optical pickup 10 and the protective cover 30 is in the form of a plate spring. One end of the ~~plate spring and~~ the heat conducting member 41 is fixed to the optical pickup 10, the other end of the heat conducting member 41 is not fixed.

Please replace paragraph number [0023], with the following rewritten paragraph:

[0023] A concrete example according to the present invention is explained with reference to Figs. 4 to 6. The optical pickup 10 in the example includes two semiconductor laser elements 60 and 61 for DVD and CD respectively. Fig. 4 is a

perspective view of a pickup drive mechanism including the optical pickup 10. Fig. 5 is a perspective view of an internal structure of the optical pickup 10. Fig. 6 is a perspective view of an optical system in the optical pickup 10.

Please replace paragraph number [0024], with the following rewritten paragraph:

[0024] As shown in Fig. 5, the optical pickup 10 includes the pickup base 11. Components that form the optical pickup 10 are installed on the pickup base 11. The pickup base 11 includes main bearings 51 and a sub-bearing 50 into which a main shaft and a sub shaft, both of which are not shown, are inserted, and is movable in the tracking direction by a pickup carriage (not shown). The pickup carriage is arranged under the protective cover 30 shown in Fig. 4.

Please replace paragraph number [0030], with the following rewritten paragraph:

[0030] A return light reflected at the optical disc permeates the objective lens 13, the deflecting mirror 80, the quarter-wave plate 79, the collimator lens 78, and the aberration correction element 77, and is then deflected with the beam splitter 73, and then enters the light receiving element 76 via the cylindrical lens 75. Based on a detection signal by the light receiving element 76, a focus error signal and a tracking error signal are created, and a reproduction signal that information recorded in the optical ~~recording medium~~ disc is demodulated and reproduced is acquired.

Please replace paragraph number [0031], with the following rewritten paragraph:

[0031] The optical pickup 10 configured as described above is mounted to the main shaft and the sub-shaft arranged inside a supporting frame 46 shown in Fig. 4 via the main bearings 51 and the sub-bearing ~~52~~ 50 shown in Fig. 5. In the supporting

frame 46, a pickup carriage (not shown) including a motor and a circuit board 45 are arranged. A flexible printed-circuit board 47 is connected to the circuit board 45.

Please replace paragraph number [0032], with the following rewritten paragraph:

[0032] As shown in Fig. 4, the protective cover 30 has an opening in a region in which the turntable 1 is provided and the objective lens 13 moves. The protective cover 30 is fixed on the supporting frame 46 to prevent a user from touching the optical pickup 10, the pickup carriage, the circuit board 45, the flexible printed-circuit board 47 and the like.

Please replace paragraph number [0033], with the following rewritten paragraph:

[0033] To cause the protective cover 30 with a large surface area to serve as a heat sink, the heat conducting member 40 in the form of a ductile sheet is arranged between the optical pickup 10 and the protective cover 30. One end of the heat conducting member 40 is fixed to the two semiconductor laser elements 60 and 61 and the laser holders 62 and 63, while the other end of the heat conducting member 40 is fixed to a bottom surface of the protective cover 30.

Please replace paragraph number [0034], with the following rewritten paragraph:

[0034] Thus, in the example, heat generated in the optical pickup 10 is conducted to the protective cover 30 via the ~~ductile~~ heat-conducting member 40, thereby increasing a heat radiating surface area substantially. Furthermore, because the protective cover 30 is directly blown with an air flow generated by turning a disc, thermal diffusion at the protective cover 30 is efficient. Accordingly, a rise in temperature of the semiconductor laser 20 can be efficiently suppressed. Furthermore, unlike a conventional technology that additionally provides a heat

radiating member, heat is radiated by using the protective cover 30 that is already provided over the optical pickup 10, thereby achieving an optical pickup that is small in size, light in weight, and low in cost.

Please replace paragraph number [0036], with the following rewritten paragraph:

[0036] ~~Thus, the present invention can be applied to an optical-disc recording-reproducing device, a DVD/CD recorder, a DVD/CD player, a DVD/CD drive for computer, a next-generation DVD using a blue-violet laser beam, and the like~~ Thus, the present invention can be applied to an optical-disc recording-reproducing device, a DVD/CD recorder, a DVD/CD player, a DVD/CD drive for computer, a device for a next generation DVD using a blue-violet laser beam, and the like.